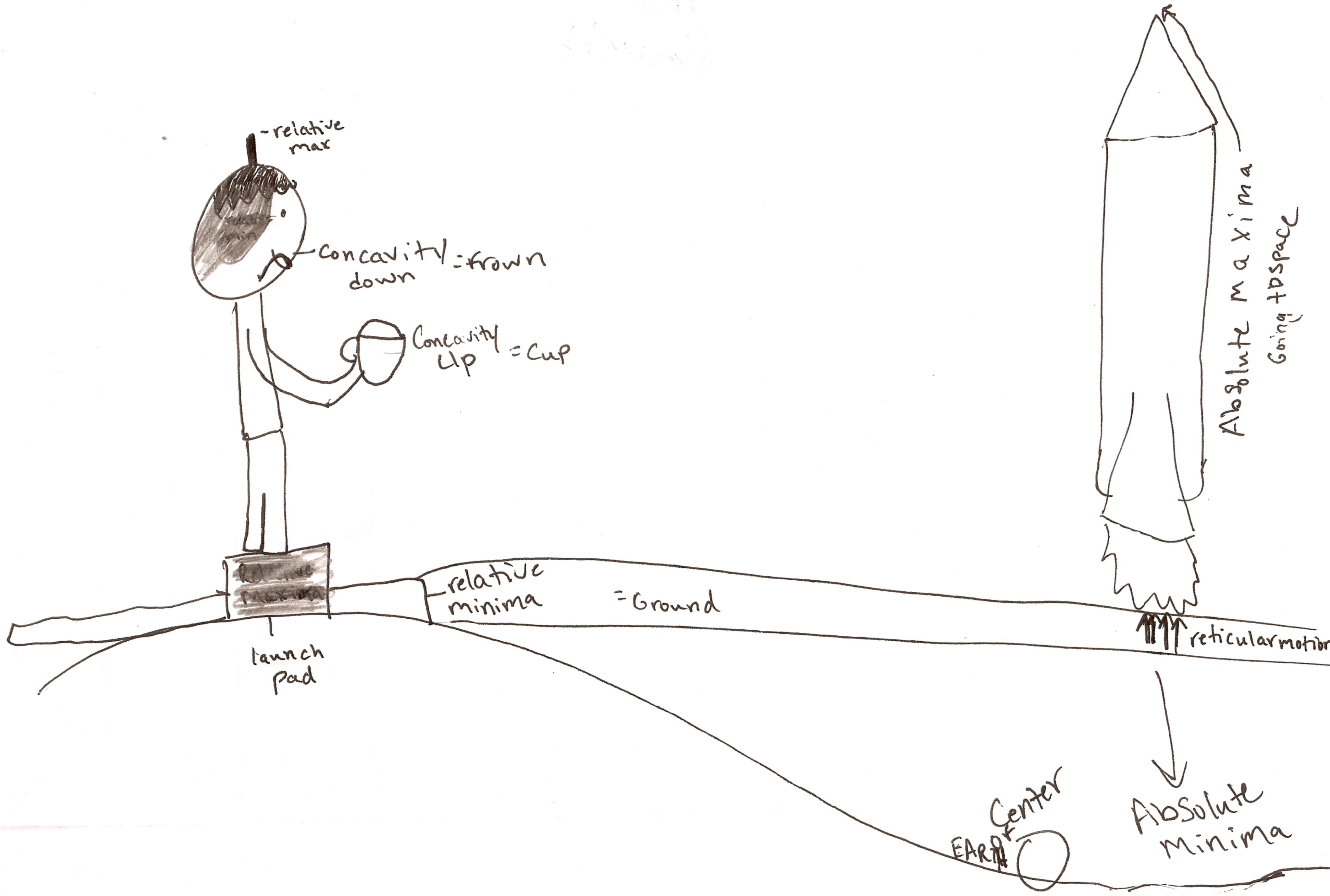

relative max
Concavity down = frown
Concavity up = cup
launch pad
relative minima
= Ground
Absolute maxima
Going to space
reticularmotion
Center of EARTH
Absolute minima

So you have a function...
position and time

You want to know the velocity, so take the derivative.

5.1 Where does the velocity increase, decrease, or remain constant?

*IDEA: concavity, points of inflection

5.2 What are the highest and lowest velocities over a set time?

*IDEA: relative maximum / relative minimum > derivative tests

5.3 What does the graph of the velocity function look like?

* IDEA: multiplicities

Take the second derivative of the initial function. (find acceleration function)

5.4 Where does the acceleration increase, decrease, or remain constant?

*IDEA: points of inflection, concavity

5.5 What are the highest and lowest velocities/accelerations over the entire domain?

* IDEA: absolute maximum/minimum

5.6 Why do we care about any of this? (What are the applications of the techniques we've learned?)

* IDEA: practical applications

Will Baker
January 4, 2011
AP Calculus 3

Chapter 5: The Derivative in Graphing and Applications

In 5.1, the chapter introduces you to the idea of how the derivative of function can be analyzed graphically and how you can point out the function properties such as when the function is increasing or decreasing, determine its concavity and points of inflection. So 5.1 is like reading the instruction manual on a new piece of equipment whatever it may be.

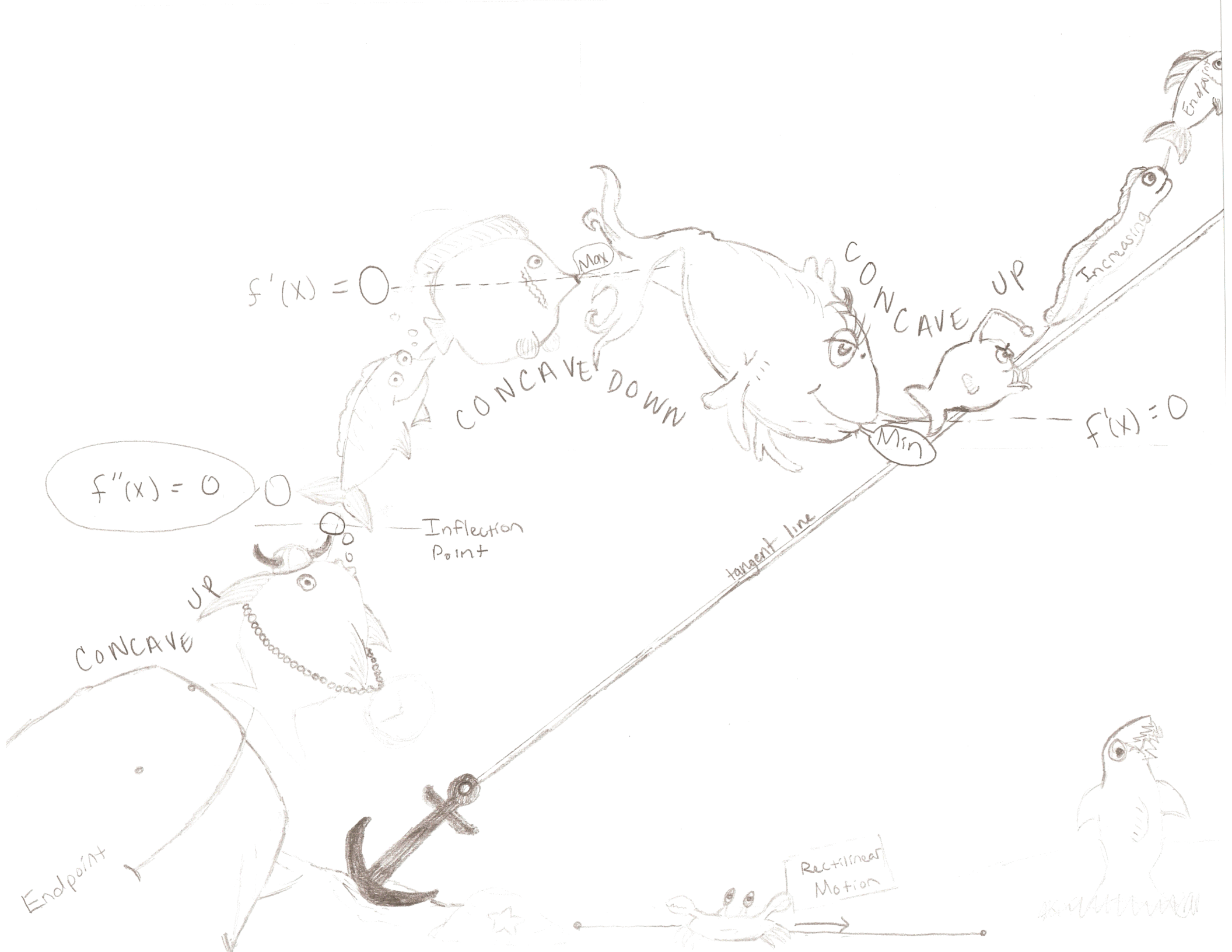
5.2 discusses the idea of the first and second derivative test of a function and how using the derivatives allows you to find critical points that point out were the function equal zero. The first derivative explains the idea of how between the critical points of the function determine whether or not the function is increasing or decreasing. The second derivative test, shows critical points that show were the function has a concave up or concave down between critical points. 5.2 is like trying to work your new piece of equipment, but the problems is that your having ups and downs with the new piece of equipment because you decided to not really pay attention to the instruction manual and tried to work it on your own.

5.3 is just an expansion of 5.2 but this time the section discusses the use of technology and the tools of calculus to analyze various types of functions graphically. The section gives a nice clear concise 6 step process for using calculus and the derivative rules for analyzing more complex functions, so the section goes in more in-depth with the functions behaviors. So 5.3 is the idiots manual you purchased online to help you out with the piece of equipment you bought.

5.4 is an AP physic student's dream because it talks about functions pertaining towards position vs time, velocity and acceleration. The section uses the first and second derivative test to analyze a position vs time function to show the velocity and acceleration of original function. It is just a more specific approach to the first and second derivative test. 5.4 represents the first time you actually get you use your piece of equipment; you get the feel of how it works in real life situations (but are simple situations).

5.5 is a simple explanation of Absolute Maxima and Minima in a function. The first derivative is heavily used to determine the absolute max and min, but some functions do not have an absolute max (x^2) or an absolute min ($-x^2$), that is when closed intervals come into play, where within those closed intervals there is only one absolute max and/or one absolute min. 5.5 is when you test the ability of your new piece of equipment and you realize that it has a lot more power than you thought it did.

5.6 is dreadful, now Is when your true knowledge of the first and second derivative rule come into play, when it is applied to real life applications, like building a fence or find the most cost efficient box size. It may seem like a walk in the park but 5.6 is like Related Rates on steroids, but with complete understanding of the pervious sections and the help of a super math genius (cough* Bob Wilder cough*) it is nothing more than just putting the pieces together with a derivative and basic function for Area. 5.6 is like when you put your new piece of equipment to the test in repairing things around your house, if you read your instruction manual and watched the demo on youtube you should have no problem but you have a lot of repairing to do.


f'(x) = 0
Max
CONCAVE DOWN
CONCAVE UP
Increasing
Endpoint
f'(x) = 0
Min
f''(x) = 0
Inflection Point
tangent line
UP
CONCAVE
Endpoint
Rectilinear Motion

Chapter 5

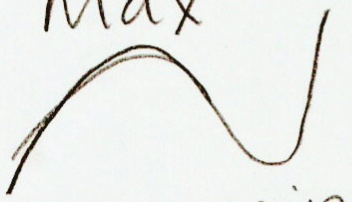
5.3 Analysis of functions

+

5.4 Rectilinear Motion

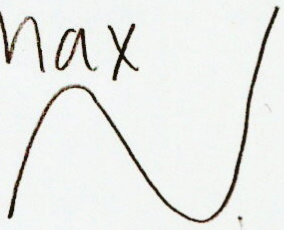
+

5.5 Absolute Max



+

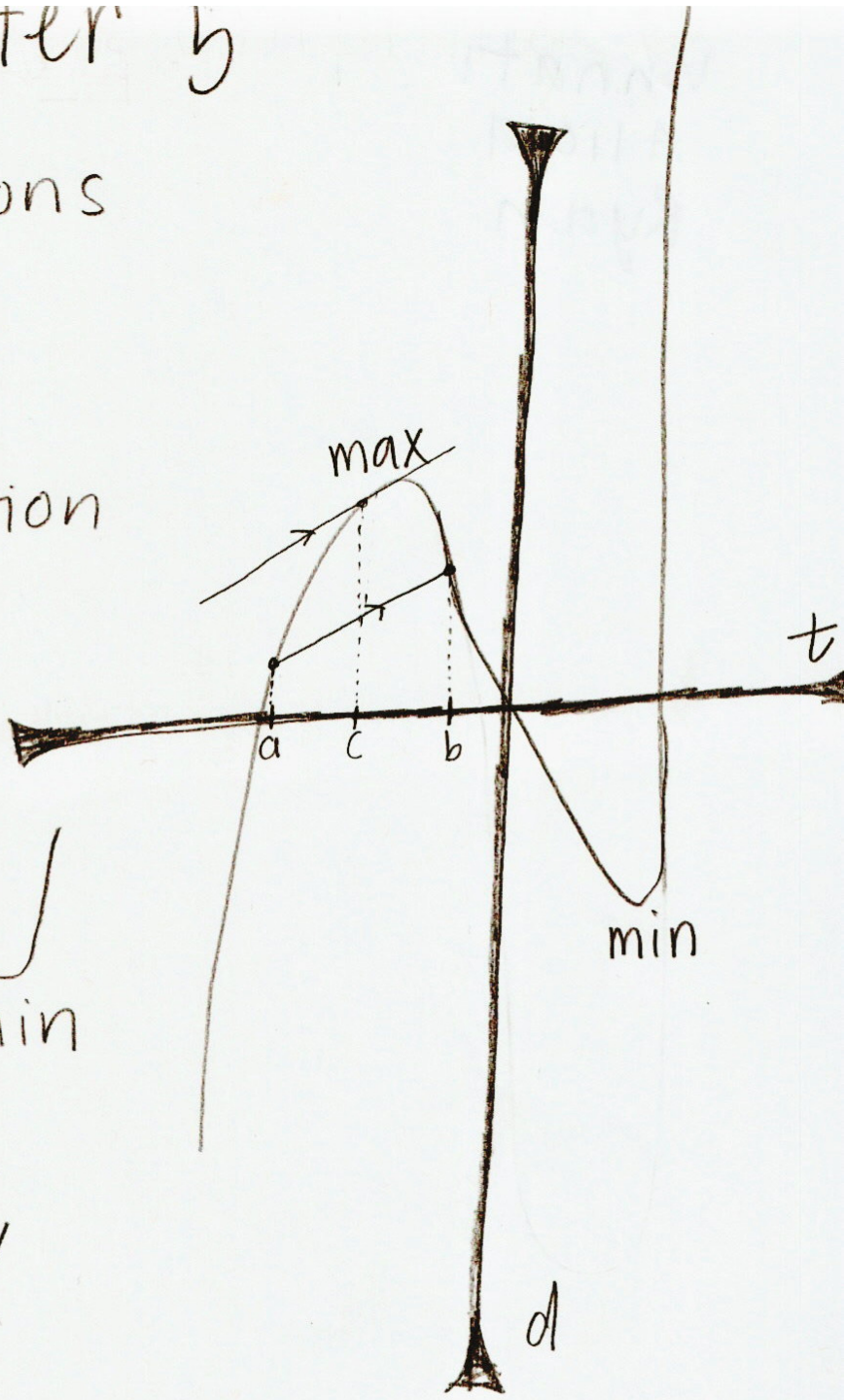
5.6 Aplied Max

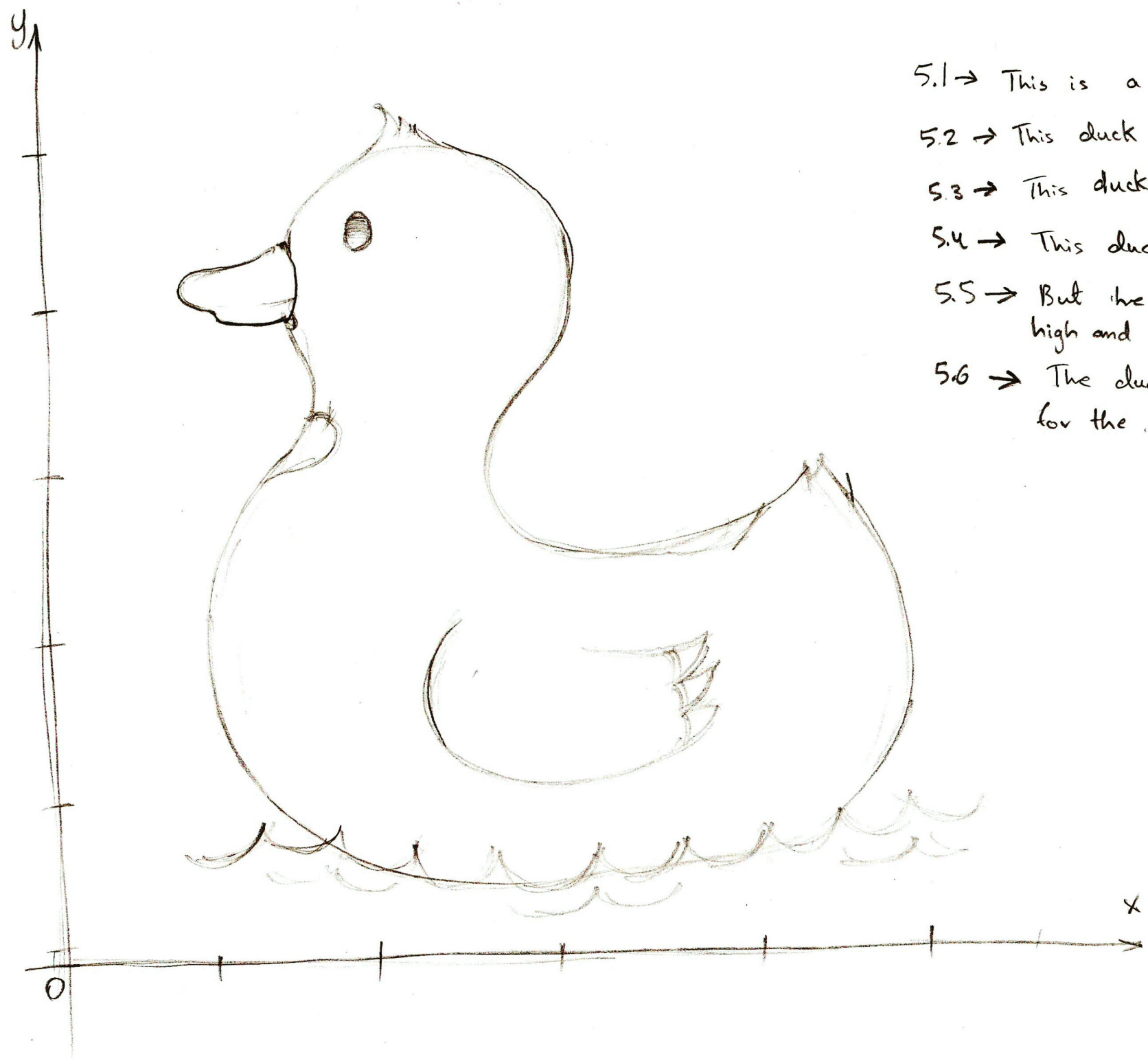
+ 

5.8 MV - Theorem

=

Derivative & Graphing





5.1 → This is a duck

5.2 → This duck has features

5.3 → This duck has a bill

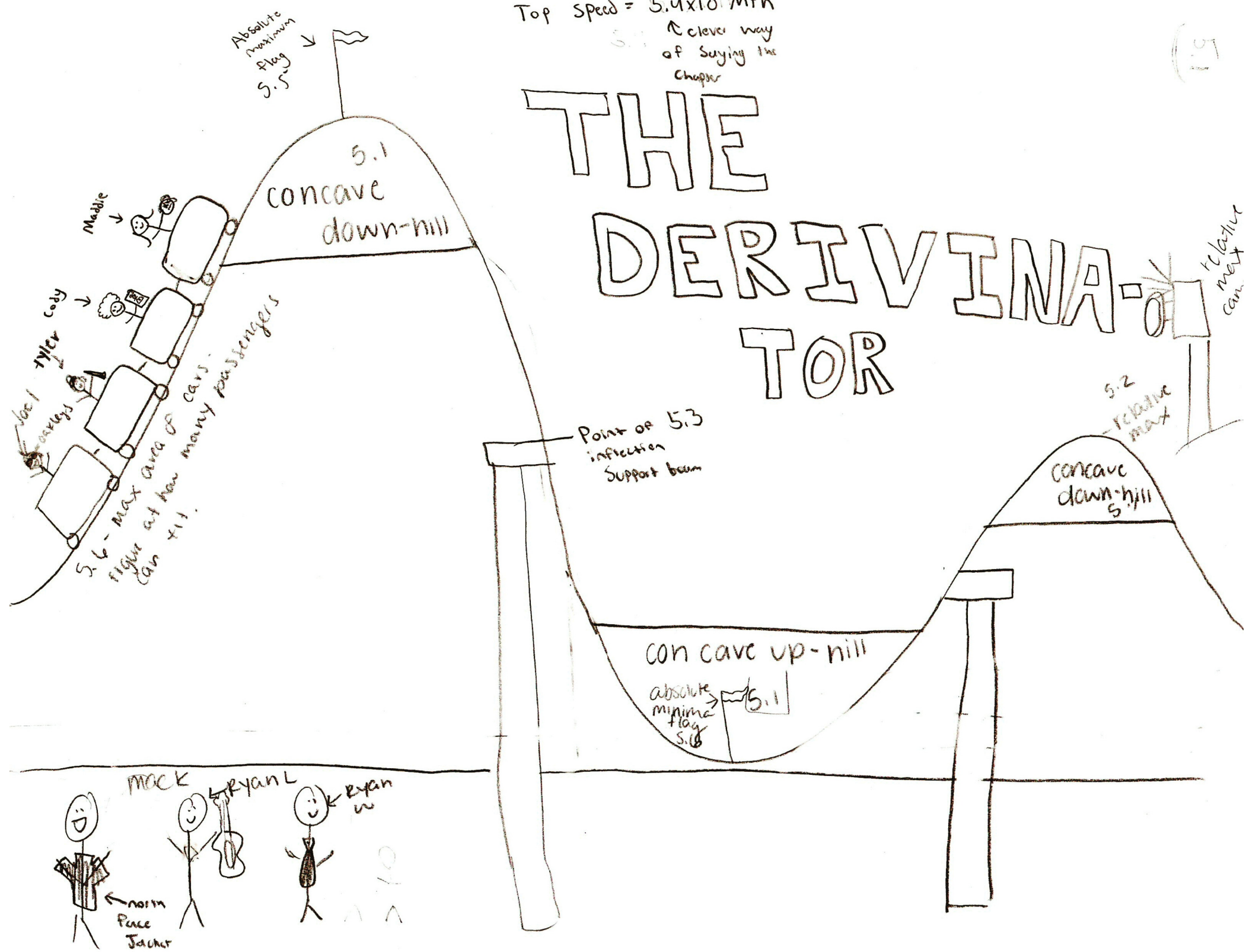
5.4 → This duck can fly

5.5 → But she can only fly so high and so low

5.6 → The duck flies south for the winter

Top Speed = 5.4x10 MPH
↑ clever way of saying the chapter

THE DERIVINATOR



Increasing fn	f' positive
Decreasing fn	f' negative
	f' 0
	f' increasing
	f' decreasing

f^n concave up	f'' positive
f^n concave down	f'' negative

relative maximum
relative minimum
absolute maximum
absolute minimum

position
velocity
acceleration